## APPLICATION

## FOR

# UNITED STATES LETTERS PATENT

TITLE:

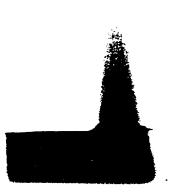
A SCHEME FOR SPREAD SPECTRUM MULTIPLE

ACCESS CODING

INVENTORS: DAOBEN LI

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This application is a continuation of PCT/CN98/00151 filed August 4, 1998.

#### Field of the Invention

The invention relates to a spread spectrum and digital multiple access wireless communications scheme, especially to a spread spectrum multiple access coding scheme applied in any digital communications system employing code division multiple access ("CDMA") and spread spectrum radio.

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### Background of the Invention

With the coming of the information society and the personal communications era, the demand on wireless communications technology is growing rapidly, but the frequency resources are very limited. A code division multiple access ("CDMA") technique is the only efficient way to resolve the contradiction between limited frequency resources and demand for high capacity. The capacity of traditional wireless multiple access techniques, e.g., frequency division multiple access ("FDMA") and time division multiple access ("TDMA"), is fixed once designed, i.e., additional users can not be introduced beyond that capacity limit. But CDMA is different in that the capacity is only limited by the interference level and thus results

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in the advantages of large capacity and soft capacity. That is, introducing an additional user is not precluded even though it may lead to reduced signal-to-noise ratio and quality of communications. So, unlike FDMA or TDMA, an insurmountable capacity limit does not exist.

As is noted above, the capacity of a CDMA system is interference-limited, thus, whether the interference level can be controlled or not determines the system's quality. Generally, the interference in the system consists of four parts: the first is local noise, which may be reduced by applying a low noise amplifier; the second is multiple access interference ("MAI"), which comes from the other users in the system; the third is inter-code or intersymbol interference ("ISI"); and the fourth is neighboring cell or adjacent channel interference ("ACI"). By employing well-designed multiple access codes, MAI, ISI and ACI can be reduced or even eliminated.

In any CDMA system, each user has a specific spread spectrum multiple access code for identification. Furthermore, to reduce the users' mutual interference, the spread spectrum multiple access codes must be orthogonal to each other. Indeed, orthogonality between any two users' signals is always required in any multiple access system. Given that the channel is an ideal linear time-invariant system, and accurate synchronization is realized in the system, then orthogonality between any two users' signals